QUANTITATIVE APTITUDE

POCKET KNOWLEDGE

BY EDUGEEKS.IN

Starting with ***ADDITIONS;*** this is a very easy topic and let us think something out of the box! Instead of proceeding with the traditional method of adding numbers from right to left, i.e., adding digits in the units place and proceeding to higher places, why can't we start from the left side, i.e., from higher place to the units place It's a bit interesting right? So, let us have a look at it now and we will also have some examples!

Let us begin with easier examples; from there on we will increase the difficulty:

1) 24 + 32 =?

Anyone can easily say the answer for this to be 56! But what method do you follow? The same old traditional method of adding from right side and if carry occurs add to the number in the tens place, right??

Let us reverse the tradition now. Let us start from the left ➔ 20 + 30 = 50 and then 50 + 4 = 54; 54+2 = 56. In your minds, you have to calculate something like this: 20 -> 50 -> 54 -> 56

Try to catch the sequence at the earliest.

Let me make you still clearer, let us think that we need to add: **758+698**

758 = 700+50+8

+ 698 = 600+90+8

In your mind calculate from left to right but not from right to left as we always do. i.e., 700 -> 1300 -> 1350 -> 1440 -> 1448 -> 1456

Hence, the answer is **1456.**

Another ***example***: 333+445+556+789=

In your mind calculate like this: 300 => 700 => 1200 => 1900 => 1930 => 1970 => 2020 => 2100 => 2103 => 2108 => 2114 => 2123

(At first it will be very difficult; if you go on practicing it definitely u will become master in this for sure!)

Some more examples:

237+956+421+387+503 =?

200 -> 1100 -> 1500 -> 1800 -> 2300 -> 2330 -> 2380 -> 2400 -> 2480 -> 2487 -> 2493 -> 2494 -> 2501 -> 2504

And yes, if you have mastered in this technique, then you can skip the steps: how? Follow the below given procedure:

230 -> 1180 -> 1600 -> 1980 -> 2480 -> 2487 -> 2493 -> 2494 -> 2501 -> 2504

Simple, isn't it? You can even reduce the steps according to your convenience!

Now, you people try for:

1235+359+22+9 =?

2240+5589+6601+235 =?

PS: If you want to master yourself in this technique, then the only thing you need to do is to practice this technique as much as possible framing questions on your own.

Next is ***SUBTRACTIONS***.

The same thing we are going to do even here. We are going to subtract numbers from left to right instead of the traditional method of subtracting from right to left and taking carry if needed.

EXAMPLE1: 23 – 11 =?

Solution: Ahhh man! I know the answer. It's pretty simple!

Yes it is I too agree. But the thing is we are going it in a different way; let us start from the smaller numbers...

$$\begin{array}{r} 23 \\ \underline{-\quad 11} \end{array}$$

$$\left.\begin{array}{l}\text{Step one: }(2-1)=1\\ \text{Step two: }(3-1)=2\end{array}\right\} \Rightarrow \text{Answer} = \boxed{12}$$

So, now you must have got an idea, right? The thing you are doing is, you are first subtracting the numbers in the higher places and then coming to the units place.

What if we need to take carry? Yes, you can face such problems and very often you do them in competitive exams. Can we have some examples based on this now?

EXAMPLE2: 54 – 28 =?

SOLUTION: As you can see in the units place, 8>4 and you need to borrow from the previous number

and this becomes traditional method again! So what will be the solution?

In such cases, place ‘zero’ in the resultant and write below the zero the difference of the numbers. Not clear? See the below solution

5 4
\- 2 8

3 0
-4 (As difference between 8 & 4 is 4)

26

Got the solution? What you are doing is that, you are subtracting the numbers from right side and if you encounter with a digit in the minuend less than that in the subtrahend, then place a zero in the difference and below the zero, place the original difference between the digits and subtract it from the number. We will have a look at some more examples:

EXAMPLE: 543 – 276 =?

SOLUTION:

5 4 3

2 7 6

3 0 0

\- 3 3

267

You may all have a doubt now that, why do we need to follow this technique when we have the traditional method? The answer is: It is better to subtract numbers from the ones which are ending with zeros right! So, we follow this method which is more conventional.

EXAMPLE: 1320 – 789 =?

SOLUTION:

1 3 2 0
-7 8 9

---

1 0 0 0
- 4 6 9

331

Next is ***MULTIPLICATIONS***

You will have a numerous number of methods and tricks under this section and we will have look at the most important ones in the exam point of view:

SUM – 10 METHOD:

Type – 1:

Let us consider an example, in which we need to multiply 78 and 72. Now when we observe these two numbers, we can conclude that, if we add the numbers in the unit's place, the resultant is 10 and the numbers in the ten's place are both the same. In such cases, we can have a simple solution.

Step1: multi the numbers in the unit's place and write down the resultant. (8*2 = 16)

Step2: say, the number in the ten's digit is a, then multi a*(a+1) and write down the resultant. => (7*(7+1) = 56)

Step 3: write the final result: 5616

Some more examples: 54*56, 79*71, 34*36 etc.

What if we get three digit numbers in the same format as above?

For example:

118*112 =?

The answer is simple; as we did in the above! That is: 8*2 = 16; and 11*(11+1) = 11*12 = 132. And hence the result is: 13216.

*In short: ab*ac = (a*(a+1))(b*c)*

Type – 2:

If we have numbers (either 2-digit or 3-digit) in the reverse order: that is: 46*66 =? i.e, the numbers in the ten's place sum up to 10 and the numbers in the unit's place are equal.

Step1: multi the numbers in the unit place and write the resultant. (6*6 =36)

Step2: multi the numbers in the ten's place and add the number that is in the unit's place

(4*6=24; 24+6 =30)

Step3: write down the result: 3036

*In short: ba*ca = ((b*c) + a)(a*a)*

Type – 3:

A slight difference exists with the three digit numbers: example: 211*811=?

Step1: multi the numbers that are equal and write it in the result. (11*11 =121)

Step2: now multi the numbers in the hundred's place and add the number in the ten's

place to the resultant (2*8 = 16; 16+1 = 17)

Step3: now place the digit in the unit's place in between the resultants of step 1 & 2; i.e.

17**1**121. This is the final result.

Some more examples: 410*610 = 250100; 711*311 = 221121 …

*In short: ba*ca = ((b*c) + a)(a)(a*a)*

BASE METHOD:

If you get multiplication of two numbers, which are nearer to the base numbers then you can use this method. Base numbers, in general, are nothing but multiples of 10. If the given numbers are nearer to base numbers, then you can follow this method to multiply them.

EXAMPLE: 98*95 =?

SOLUTION:

Here 98 is ‘2’ less than the base number 100 and 95 is ‘5’ less than 100. You can write them like this:

98	-2
95	-5

The first step will be deducting/subtracting the resultant of the diff between the base number and the given number with the given number in a cross-way! That is, you need to subtract 98 and 5 (which is the resultant of difference between the base number and 95) or you can also cross-subtract 95 and 2, the result will be same. This result forms the 1st part of the resultant at the start. The last part of the resultant will be multiplication of the differences from base numbers (i.e., 2 * 5 = 10)

98	-2
95	-5
(98 – 5)	(-2 * -5)

Hence, the answer will be: **9310**

EXAMPLE: 998*997 =?

SOLUTION:

998 -2

997 -3

Observe carefully, in the second part, the multiplication of difference yield in a single digit number, but no. of zeroes in the base number, here 1000, is three. Hence add two zeroes before the result.

Therefore, the answer will be: (998-3) | (-2 * -3) = **995006**

EXAMPLE: 47*49 =?

SOLUTION:

What if the numbers we get are like this? I mean, the base is 50 here. We will follow the same procedure as above but a small difference that the resultant in the first part will be halved. And if the base is 200, then the number will be doubled and so on based on the base number.

47	-3
49	-1

The first part will be (49 – 3) = 46 and the matter doesn’t end here, you need to divide the result by 2. 46/2 = 23 -> this becomes the first part of the resultant. The second part will be: 3 * 1 = 3

Hence, the answer is: 2303 (Don’t get confused, you have to place ‘0’ in front of ‘3’ as the original base will be always 100.

PS: Note that, the number of digits in the second part must be equal to the number of zeroes in the base number.

EXAMPLE: 202*204 =?

SOLUTION:

Now what if you are given with numbers, which are nearer to the base number and more than it? The same procedure will follow; instead of subtracting you will be adding them!! That's it!

202	+2
204	+4

The first step will be cross-adding the number with the result of the difference between the given number and the base number (here 200). -> 202 + 4 =206; and as the base is 200, we need to multiply the answer with '2' -> 206*2 = 512. This will be the first part of the resultant and the second part will be 2*4 = 8; but the base number has two zeros -> 08

Therefore the answer for the given question will be: **51208**

EXAMPLE: 102*96 =?

SOLUTION:

When we look at this question, one is above the base number and the other is below it. How to solve such kind of questions? The procedure will be same as above but the only difference will be after obtaining the first part of the resultant, add zeroes, equal to that of the zeros in base number and subtract the second resultant from the first. The final resultant will be the answer.

102	+2
96	-4

First step will be cross-adding/subtracting -> 96+2 = 98; the base here will be 100, so '2' zeros will be added to 98 ➔ 9800

The second step is multiplying 2 & 4 = 8 (and the sign will be –ve)

➔ 9800 – 08 = **9792**

MULTIPLICATION WITH 5, 25, 50

With 5:

What will be the answer for 122*5 =? Most of you may do it in a minute or 30 seconds. What if I do tell you that, you can do this problem in less than the above mentioned time? This will be possible if you are well trained in dividing numbers with ‘2’.

5 can be written as: 10/2 right? This will make calculations easier... 122*5 = 122*10/2 = 61*10 = 610

EXAMPLE: 234*5 =?

SOLUTION: 234 * 5 = 234 * 10/2 = 117 * 10 = **1170**

EXAMPLE: 1375*5 =?

SOLUTION: 1375*5 = 1375 * 10/2 = 687.5 * 10 = **6875**

With 25:

As we did for 5, we can do it for 25 also! We know that, 25 is square of 5. Hence the multiplying factor will also be the square of 10/2 = 100/4

EXAMPLE: 172*25 =?

SOLUTION: 172*25 = 172 * 100/4 = 43*100 = **4300**

EXAMPLE: 237*25 =?

SOLUTION: 237 * 25 = 237 * 100/4 = 59.25 * 100 = **5925**

With 50:

The same continues even with 50; you need to multiply the number with 100/2.

EXAMPLE: 1375*50 =?

SOLUTION: 1375 * 50 = 1375 * 100/2 = 687.5*100 = **68750**

EXAMPLE: 23460*50 =?

SOLUTION: 23640 * 50 = 23640 * 100/2 = 11820*100 = **1182000**

Multiplication of numbers Ending with 5 and having a difference of 10

If we are given a problem, say: 125*135; the numbers are ending with 5 and have a difference of 10. In such cases, we can't go with the general 3-digit multiplication procedure. You have a simple trick by which you can get the answer. The last two-digits of the resultant will always be "75". For the remaining digits, just take the larger number among them and square the number other than the last digit, '5' and subtract '1' from the resultant.

That is in the above example: 125*135, both the numbers have a difference of 10 and are ending with 5. The larger number is 135 and the number other than '5' is '13' ➔ 13^2 = 169; 169 – 1 = 168. And the last 2-digits will be: 75

Therefore: 125*135 = **16875**

EXAMPLE: 55*65 =?

SOLUTION: 65 is larger number -> 6^2 = 36; 36 – 1 = 35 ➔ 55*65 = **3575**

EXAMPLE: 175*185 =?

SOLUTION: 185>175 -> 18^2 = 324; 324 – 1 = 323 ➔ 175*185 = **32375**

EXAMPLE: 595*605 =?

SOLUTION: 605>595 -> 60^2 = 3600; 3600 – 1 = 3599 ➔ 595*605 = **359975**

Multiplication with 11:

When you het problems based on numbers being multiplied by '11', many feel it difficult. But I tell you, it is one of the easiest ways of multiplication. Let me explain this by taking an example:

EXAMPLE: 133*11 =?

SOLUTION:

The solution is pretty simple. You just need to add the numbers of the multiplicand to get the resultant! Simple isn't it? Let us see how! Here 133 is the multiplicand, 11 is the multiplier.

Step 1: The unit's digit of the result will be same as that of the multiplicand one

Step 2: Add the unit's digit of the multiplicand with the digit before it, which is in ten's place and write the resultant. And continue this process till you reach the highest place.

Step 3: After you reach the highest digit, you need to write the highest digit in the multiplicand as the highest digit in the resultant too! This forms your answer.

133*11 = 1 | (1+3) | (3+3) | 3 = **1463**

EXAMPLE: 987*11 =?

SOLUTION: 987*11 = 9 | (9+8) | (8+7) | 7 = **10857**

P.S.: There will be a carry produced while adding 8 & 7 and the carry will get forwarded to the next number and the same continues.

EXAMPLE: 13547*11 =?

SOLUTION: 13547*11 = 1 | (1+3) | (3+5) | (5+4) | (4+7) | 7 = **149017**

Multiplication with 9, 99, 999 and so on:

Till now we have seen multiplication with different numbers! Now, let us have a look at the numbers being multiplied with 9, 99, 999 and so on…

With 9:

It is very simple to multiply any number with 9. Let us have some examples, starting with smaller numbers:

EXAMPLE: 24*9 =?

SOLUTION: 24 * 9 = 24 * (10 – 1) = 24*10 – 24 = 240 – 24 = 240 – 20 – 4 = **216**

PS: How to solve the problem? 9 can be written as (10 – 1), so this will make it easy for us to solve these type of problems. It is simpler to subtract from number ending with zero, than multiplying the whole number with 9.

EXAMPLE: 237*9 =?

SOLUTION: 237 * 9 = 237 * (10 – 1) = 2370 – 237 = 2370 – 200 – 30 – 7 = **2133**

EXAMPLE: 53457*9 =?

SOLUTION: 53457 * 9 = 53457 * (10 – 1) = 534570 – 53457 =

534570 – 50000 – 3000 – 400 – 50 – 7 = **483113**

With 99:

As we have now known the procedure to multiply any number with ‘9’, we move a step further and try for ‘99’. And it is pretty sure that, we can try the same method as above to get the best results in the multiplication in lesser time. This might take less than 30 seconds, if and only if you are very well with subtraction.

P.S.: Each and every topic is related linked with the other one, directly or indirectly; hence you need to be perfect in all of them.

Let us show you some examples to make sure that the above technique works fine even for ‘99’.

EXAMPLE: 163*99 =?

SOLUTION: 163 * 99 = 163 * (100 – 1) = 16300 – 163 = 16300 – 100 – 60 – 3 = **16137**

Simple, isn’t it? What we have done here is that, we have split ‘99’ as ‘100-1’ which makes the problem look simpler than before, because it is easier to subtract any number from a number ending with ‘0’, which we had already taught you in the “SUBTRACTIONS” section (*Refer Top).*

EXAMPLE: 259*99 =?

SOLUTION: 259 * 99 = 259 * (100 – 1) = 25900 – 259 = 25900 – 200 – 50 – 9 = **25641**

EXAMPLE: 1328*99 =?

SOLUTION: 1328 * 99 = 1328 * (100 – 1) = 132800 – 1328 = 132800 – 1300 – 20 – 8 =**131472**

With 999:

And we can even apply the very same technique to the next series too, i.e. ‘999’ and let us see what the result will be!

EXAMPLE: 25786*999 =?

SOLUTION: 25786 * 999 = 25786 * (1000 – 1) = 25786000 – 25000 – 700 – 80 – 6 = **25760214**

EXMAPLE: 135*999 =?

SOLUTION: 135 * 999 = 135 * (1000 – 1) = 135000 – 135 = **134865**

DIVISIONS

Now, coming to the last basic operation in mathematics, division, it is the most simplest of all. For a moment let us think out of math, what does divide mean? Divide can be in simple terms called segregate or even we can say split. Coming to mathematics, dividing a number by the other can also be a sort of the same. The division consists of four main parts: dividend, divisor, quotient and the remainder.

*Dividend = (Divisor * Quotient) + Remainder*

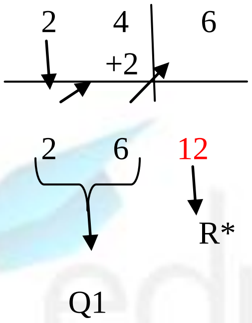
We are not going to start from the things which you have started from the age, you started to learn math. Here we are going to explain some of the well known and easy techniques, which will be helpful in your competitive exams.

DIVISION WITH 9:

We will start with an example and keeping it as a reference, we will clearly explain you the whole method.

EXAMPLE: 246/9 =?

SOLUTION: 246/9 =



+6 Q1 is the temporary quotient & R* is the temporary remainder.

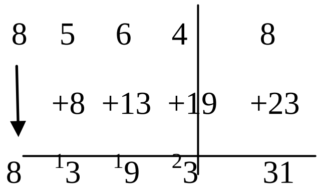
We can observe that, R8 is a number which is larger than ‘9’. Hence, we once again divide it with ‘9’ ➔ 12/9 = Q2 = 1 & R = 3. Now, add this Q2 to Q1 ➔ 26+1 = 27 and the R (=3) is our final remainder.

<u>Procedure to divide a number with 9:</u>

- Write down the dividend first and place a separator before the last digit (as the nearest base of 9 is 10 and has a single zero) of the dividend.
- Starting from the left side (i.e. the largest digit), place it as it is in the resultant. Now add this to the next immediate digit.
- The resultant of this addition will be added to the next digit and this will continue till the last digit, even after the separator.
- If you get the resultants of addition to be a 2-digit number, then the number in the tens place will be forwarded as carry and will be added to the previous number
- If the resultant is greater than the divisor, then it needs to be divided by the divisor again and the quotient will be added to the previously obtained temporary question and the remainder of this will be the final and overall remainder of the problem.
- If the resultant of the final step is not greater than that of the divisor, then it will be the remainder of the whole.

EXAMPLE: 85648/9 =?

SOLUTION: 85648/9 =



The numbers which are superscripted will be the carry and will be forwarded and added to the previous number. Hence the Q1 becomes ➔ (8+1) | (3+1) | (9+2) | 3 = 9513.

Now coming to the remainder part, 31 is greater the 9. So, 31/9 ➔ Q* =3; R =4

Q = Q1 + Q* = 9513+3 = 9516; R = 4

EXAMPLE: 1346/9 =?

SOLUTION: 1346/9 =

1 3 4 | 6

+1 +4 | +8

Q1➔ 1 | 4 8   14 ➔ R*

R* = 14/9 ➔ Q* = 1; R = 5

Q = 149; R = 5

DIVISION WITH 11:

EXAMPLE: 35779/11 =?

SOLUTION: 3 5 7 7 | 9

-3 -2 -5 | -2

3 2 5 2 | 7

Q = 3252; R = 7

<u>Procedure to divide a number with 11:</u>

- The procedure will be as same as that of the procedure we have did for '9'; but there will be slight difference that, you need to subtract the numbers instead of adding!
- Write down the left most number as same, now subtract this from the next number and the resultant of the subtraction is again subtracted from the next number!

- And this process is continued till the last. And the same is applied for the number which is after the separator; this will form the resultant remainder, if and only if it is not greater than ‘11’.

EXAMPLE: 1756/11 =?

SOLUTION:		1	7	5	6
		-1	-6		-(-1)
	1	6	-1		7

In such cases, where we get negative numbers we need to follow a simple technique. Take out the number with negative sign and place zero in its place. Then add this negative number to the remaining numbers including zero. Here, addition with negative number means, subtracting the negative number from the number ending with zero.

i.e. 1 6 -1 ➔ 1 6 0 + (-1) = 159 and remainder = 7